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EDITORIAL DEPARTMENT NOTE

Recent years have witnessed a considerable development of cost finding methods in the transportation field. Due to the competition of the automobile, the truck and the airplane, the railroads have found that rates which are not related to costs are likely to result in loss of business to competing transportation agencies. More and more, revisions and adjustments of rates are being made only after a full consideration of costs. In the field of motor transportation, trucking companies have been required to file rates with the Interstate Commerce Commission since 1937 and cost accounting methods have been widely utilized in the development of rate structures. In this issue is presented a story of the developments in railway cost finding and a case study of rate making in a motor trucking company.

The author of our first article is Arthur F. White, analyst and statistician, who is Assistant Director of the Bureau of Statistics of the Interstate Commerce Commission. Following graduation from Pomona College, Mr. White served as Statistician for the Southern Pacific Co. for 15 years. He pioneered in the development of comparable transportation statistics for railways, water lines, bus and truck lines, and in the co-ordination of railway with highway service. He served on the staff of the Federal Co-ordinator of Transportation from 1933 to 1935, having charge of collecting, analyzing and publishing statistics of railway, highway, airway and pipe-line traffic, service and costs. He became Cost Analyst and Assistant Director of the Interstate Commerce Commission in 1935. Mr. White was the leading government witness at the I.C.C. hearings on railway passenger fares in 1935 and 1938.

Harold B. Church, the author of our second article, has since 1904 been connected with companies manufacturing and using transportation equipment. His education was received at Ohio Northern University. From 1904 to 1911 he served as Chief of Demonstration and Service for the Couple-Gear Freight Wheel Co., and for the next four years as Secretary and Superintendent of the Eldridge Mfg. Co. In 1915 Mr. Church assumed the position of Transportation Manager for the John E. Cousins Coal Co. and the Curtis & Pope Lumber Co. Since 1919 he has been Treasurer and Manager of the H. B. Church Truck Service Co., and since 1933, President of the Service Mutual Liability Insurance Co. Mr. Church is a Director of both the American Trucking Associations, Inc., and the New England Motor Rate Bureau, Inc. He is also a member of the Society of Automotive Engineers, and is at present serving as Vice President of the Motor Truck Club of Massachusetts, Inc.

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APRIL 15, 1939

COST FINDING IN TRANSPORTATION

By Arthur F. White, Assistant Director,
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THE PROBLEMS of cost finding in transportation include many interesting accounting questions, such as the extent to which individual items of expense shall be earmarked at the source, but I shall touch very lightly on those questions in this article and deal principally with the results obtained by using the data now found in the carriers' accounts.

Under the provisions of the Act to Regulate Commerce, effective April 5, 1887, the Interstate Commerce Commission was empowered to require annual reports from the carriers under its jurisdiction and to prescribe for them uniform systems of accounts. However, no adequate machinery was provided at that time for enforcing this section of the law and it was not until the passage of the Hepburn Act in 1906 that penalties were provided for refusal to submit reports in the form prescribed or for misrepresenting the accounts, and that the Commission was authorized to employ examiners for the purpose of inspecting the accounts.

Reports on Uniform Basis Required

By the exercise of this authority, the Commission has obtained detailed reports of operating expenses *prepared from uniform systems of accounts and submitted under oath* by:

Steam Railways since.....July 1, 1907
Electric Railways since.....January 1, 1914
Express Companies since.....July 1, 1908
Sleeping Car Companies since.....July 1, 1910
Carriers by Water[1] since.....January 1, 1914
Pipe Lines since.....January 1, 1918

Note: Annual reports were received by the Commission for several of the classes of carriers listed above for years prior to those shown, but such reports were not based upon uniform systems of accounts. For the steam railways, the earliest reports to the Commission cover the year beginning July 1, 1887; for electric railways July 1, 1907; for express companies July 1, 1907, and for sleeping car companies August 1, 1909.

[1] I.C.C. jurisdiction over water carriers is limited to those carriers which are parties to arrangements for the continuous carriage or shipment of persons or property over joint rail-water routes.

Under the provisions of the Motor Carrier Act of 1935, the Commission's authority was extended to include highway motor trucks and busses engaged in interstate commerce, and effective January 1, 1938 uniform systems of accounts and annual report forms were prescribed for those carriers which have annual operating revenues of $100,000 or more.

All of these systems of accounts provide for elaborate separations of expenses between maintenance, transportation and general items, but none of them require the carriers to subdivide their system accounts between states, operating divisions, individual lines or services. Carriers are permitted to make such subdivisions for managerial purposes if they desire and many of them do so in varying degrees of completeness.

However, we must recognize the fact that all of the carrier expense accounts and their subdivisions have been developed primarily for the purpose of enabling management to control expenditures in the aggregate. Their principal uses have been for budgetary purposes and to disclose the aggregate expenditures for which a particular carrier official is responsible.

Use of Cost in Fixing Price

In contrast to the usual commercial practice, the transportation industry seldom, if ever, gives any consideration to the cost of providing a particular service in fixing the price at which that service will be sold. Carrier officials have persistently opposed every effort by regulatory bodies or by their patrons to compute those service costs, claiming that the inevitable result would be attempts to force down the rates on profitable traffic without raising the rates on unprofitable traffic.

The rule of rate making provided in Section 15a of the Interstate Commerce Act reads as follows:

> In the exercise of its power to prescribe just and reasonable rates the Commission shall give due consideration, among other factors, to the effect of rates on the movement of traffic; to the need, in the public interest, of adequate and efficient railway transportation service at the lowest cost consistent with the furnishing of such service; and to the need of revenues sufficient to enable the carriers, under honest, economical, and efficient management, to provide such service.

The Motor Carrier Act, 1935, Section 202, states:

> It is hereby declared to be the policy of Congress to regulate transportation by motor carriers in such manner as to recognize and preserve the inherent advantages of, and foster sound economic conditions in, such transportation and among such carriers in the public interest; promote adequate, economical, and efficient service by motor carriers, and reasonable charges therefor, without unjust discriminations, undue preferences or advantages, and unfair or destructive competitive practices; improve the relations between, and coordinate transportation by and regulation of, motor carriers and other carriers; develop and preserve a highway transportation system properly adapted to the needs of the commerce of the United States and of the national defense. * * *

Some of the members of the Interstate Commerce Commission and the State Railroad Commissions have a natural distrust of all railway cost data, recalling that a large portion of all rail carrier expenses is chargeable jointly to several services, and that there is a wide divergence of views between experts as to which method of making apportionments produces the best results.

Need for Costs Has Increased with Competition

During the period when the railways had a virtual monopoly of the transportation of the country, it seemed doubtful whether reliable cost data would have been sufficiently useful to warrant the expense of obtaining it. Carriers were charging "all the traffic would bear," subject to the prescription of maximum reasonable rates by the Commission, and those maxima were fixed, not with relation to the cost of service but with relation to other rates for comparable hauls of comparable commodities.

However, since the development of our nation-wide system of highways and navigable waterways, that condition has almost disappeared. Prospective railway passengers have available as alternative means of travel, their privately owned automobiles and common carrier busses. Almost every shipper of freight can choose his mode of transport by common or contract carrier and many have found it economical to provide their own trucks or cargo vessels. To meet the competition of privately owned vehicles and vessels, all common and contract carriers have been forced to make drastic reductions in the rates charged for handling their more profitable classes of traffic.

Need for Railway Cost Data

With the enactment in 1935 of legislation protecting established motor carrier operators, they have protested vigorously all railway rate reductions which threaten to take business from them, and by formal complaint to the Commission have attempted to force the railways to prove that their proposed reduced rates will be compensatory.

Other needs for railway cost data which have recently become important are:

(1.) For determining whether differentials in rates should be prescribed for competitive traffic as between different modes of transport such as rail and water, or rail and highway;

(2.) For use in fixing the divisions of through rates between carriers;

(3.) For apportioning between the segments of a single railway system, the revenues, expenses, and net income or loss derived from handling traffic on portions of the system covered by different mortgage liens.

Railway officers have insisted for so many years that transportation costs cannot be ascertained with reasonable accuracy and that all cost finding methods are unreliable, that they are now at a loss to known how to convince the Commission that their cost figures are representative.

Study of Railway Cost Finding Made

Under the provisions of the Emergency Railroad Transportation Act of 1933, Congress authorized the appointment of a Federal Coordinator of Transportation and instructed him to investigate and consider cost finding in rail transportation. Mr. Joseph B. Eastman, the Coordinator, employed a well known industrial engineer, Mr. John H. Williams, to study cost finding in rail transportation from the particular standpoint of the control of rates charged for freight service. He was instructed by the Coordinator to give particular attention, in connection with his study, to the desirability of arriving, if possible, at a system of continuous routine cost finding which would not impose a heavy

new burden of accounting or statistical expense upon the railroads. He was not expected to produce a system for the accurate ascertainment of precise costs. It was realized that no such system is possible, and that the utmost that can be expected is a reasonable approximation of costs based upon normal average conditions. This will be of particular value in determining relations between the costs of specific services and introducing the degree of order, consistency and uniformity in the consideration of such costs by the railroads and by the Commission which it is impossible to obtain from sporadic and special studies.

Mr. Williams completed his report in June, 1936, and it was submitted to the Interstate Commerce Commission with the following comments by Mr. Eastman:

> The railroads ..... do not yet recognize, as they soon will, the great need for information of this character in connection with present-day competitive conditions in transportation, or the demands for it which will be voiced by those who use the railroads and the other transportation agencies. The situation is one which calls for light rather than a continuation of the present darkness.

Opposition to Cost Finding

Railway managements oppose the plan principally because it provides for annual reports of cost data which would be available to any competitor, shipper or connecting line who might wish to attack a specific fare, rate, or division of through rates. Railway officers have stated that if costs are required by the Commission they should be obtained by special study of the particular service under review. They admit that some carriers maintain current records from which a large part of the cost data could be obtained, but state that other carriers without such records would be seriously burdened by the additional expense of keeping such records. They also call attention to the fact that no railway keeps detailed records of its switching services, and that to prepare a system cost report annually would necessitate the making of test period time studies at each point where switching service is performed.

Commission Study of Transportation Costing

These objections are important but not insurmountable, and with a view to determining whether the Commission should require all or any common and contract carriers to file special or

annual reports for cost finding purposes, the Interstate Commerce Commission has announced an investigation on its own motion to be known as Ex Parte 122 which will include transportation by railway, highway, waterway and pipe line. Hearings in that investigation will probably start this Spring. I am hopeful that the subject will be separated into the following parts, and separate decisions rendered on each part before the next one is taken up:

1. What kind of costs are desired,
   (a) Out-of-pocket,
   (b) All operating expenses plus taxes and rents, or
   (c) Full costs including a fair return on investment,

   and which of those kinds of costs, if any, are to be considered in fixing minimum rates, maximum rates, divisions of through rates and differentials.

2. How are the costs to be reported, i.e.,
   (a) Only as special studies for each particular case, or
   (b) As full system costs reported annually and separated between states, operating divisions, individual lines and services, and, if so, should they be open to public inspection?

3. What statistical methods and changes in accounting systems will provide the most reliable unit costs for particular services, and what is a fair rate of return on investment?

To determine what cost data may be available from the accounting subdivisions maintained by the carriers for managerial purposes, the Commission now has three accountants in the field examining the underlying records of large steam railways. Their reports indicate that for some railways a vast amount of basic cost data is currently available, which will be very helpful when, as, and if the Commission undertakes studies of the cost of handling particular movements of particular commodities.

Specific Cost Finding Investigations

While these general developments have been taking place in the field of transportation cost finding, the Commission's Bureau of Statistics has been handling many specific cost finding problems in

cases where the Commissioners or their examiners have asked it to review cost evidence presented at hearings on rate and division matters.

Two cost finding investigations relative to specific rates were undertaken on the Commission's own motion. The first (Docket 27571) covers shipments of naval stores (rosin and pine oil) by rail and by truck from points in the State of Mississippi to New Orleans, Gulfport and Mobile. Detailed cost finding schedules prepared by the Commission's staff were submitted as questionnaires to the two railways and the two truck operators handling the traffic, with instructions to submit the information at a formal hearing together with any other cost data which the carriers might desire to introduce. Each of the carriers chose to rely solely upon the Commission's schedules for the cost data, and agreed at the hearing that the results produced were representative. A proposed report by Examiner Bardwell found that some of the proposed railway rates were sufficient to cover the full distributed costs, including return of 5¾ per cent on the investment, but that other rates would not cover those costs. The highway truck operators' costs were higher than those of the rail for comparable distances, although on one route the highway mileage is considerably shorter than the rail. The Commission's decision as to whether the railways will be allowed to establish their proposed rates will probably be issued within the next sixty days.

A second investigation (Docket 27565) involves the movement of petroleum and petroleum products in rail tank cars and highway tank trucks from California refineries to Arizona distribution points. The traffic is handled by three steam railways, one electric railway, and six highway truck operators.

The Commission prepared cost finding schedules for each of the carriers and asked that the information be furnished at the hearings together with such other data as the respondents might desire. The truck operators chose to rely solely upon the Commission's schedules. The railways supplemented the Commission's schedules with short-cut cost studies of their own which produced approximately the same final results. During the hearings the truck operators conceded that they could not meet the rail costs but contended that the public interest requires the raising of both rail and truck rates to a point where they will cover the truck

costs so that the competitive highway service may be preserved. A proposed examiner's report is now being prepared, based upon analysis of the evidence submitted.

Cost Investigation in Connection with Rail-Barge Joint Rates

The third cost finding investigation (Docket 26712, Rail-Barge Joint Rates) involves the fixing of differentials between

(a) The joint freight rates over through routes when one of the carriers is a barge line on the Mississippi or Warrior Rivers or their tributaries, and

(b) The joint freight rates over through routes between the same origin and destination points when all of the carriers are rail lines.

There are many interesting cost finding problems in this case and probably no recent proceeding before the Commission has consumed so much time of as many witnesses and lawyers. Nearly 15,000 pages of oral testimony have been taken and more than 1,300 exhibits have been filed in evidence. Many of those exhibits are books of figures and some have been supplemented from one to five times.

Commission hearings, begun nearly four years ago, were completed late last year, except for cross-examination of witnesses for the Bureau of Statistics upon their proposed restatement of cost data. It seems probable that the carriers have spent for this cost data at least a quarter of a million dollars.

The Facts of This Case

Briefly outlined, the facts are that under the provisions of the Inland Waterways Act, the Interstate Commerce Commission is ordered to require all common carriers to join in reasonable through routes and joint rates with the barge lines operating on the Mississippi and Warrior Rivers and their tributaries. The Interstate Commerce Commission is also required to fix reasonable differentials to apply between the joint barge-rail rates and the all-rail rates. The present differentials were fixed when the barge lines were first established and before the cost of that service could be measured. Those differentials make the present joint barge-rail rates lower than the all-rail rates to the extent of either 10 or 20 per cent of the local rail rates between the ports.

When the rail lines filed complaints against the joint barge-rail rates, the Commission instituted a general investigation. The rail lines claim they have ample facilities to handle all of the traffic and that no differentials are warranted as there is no true economy in barge operation compared with rail operation. The barge lines state that differentials are necessary if shippers are to be induced to use the through barge-rail routes, as service via those routes is slower than via the all-rail routes, and they also claim that the joint barge-rail costs are lower than the all-rail costs.

Each of the rail lines serving the Mississippi Valley has made a statistical analysis of its terminal and line-haul costs. Time studies have been conducted at nineteen ports to determine the cost of switch engine service used in interchanging traffic with the barge lines. Comparative statements have been prepared listing about 1,000 actual carload shipments which moved via the barge-rail routes and for each of them both the rail and the barge costs have been computed and compared with the estimated rail costs if the same shipments had been handled over so-called logical all-rail routes.

Contentions of Barge Lines

The barge lines claim that the rail costs of the past few years are considerably less than normal, as they have not been adjusted to allow for deferred maintenance work which has accumulated during the depression. The barge lines have also made studies of the routing of all shipments which they interchanged with the rail lines during a six-months period and report that for the rail portion of the haul on joint traffic the rail carriers actually moved that traffic over routes 14 per cent longer than the shortest workable routes. They conclude that rail traffic, generally, is handled over circuitous routes and that actual rail costs are, therefore, considerably greater than the estimated costs for movements over the shortest workable routes.

All of the phases of the problem must be taken into consideration by the Commission's Bureau of Statistics in restating the barge and rail costs on a comparable basis.

Data on Cost of Private Transportation Needed

These examples will illustrate the change which has taken place in the attitude of the Commission and the common and contract

carriers toward cost finding as a factor in rate making. However, there is another field of transportation about which we have very little cost data, although eventually it may be recognized as more essential than the others. I have in mind the cost of private transportation—freight and passenger.

It is generally agreed by all those interested in transportation rate making that the ceiling of the rates on any commodity is the cost to the shipper of providing his own transportation. The failure of common and contract carriers to recognize that ceiling has frequently resulted in the establishment of privately operated water lines and the purchase by commercial firms of large fleets of trucks for handling their own line-haul traffic. It seems probable that if all costs were taken into consideration it would be found that much of the private hauling is more expensive than similar service performed by common and contract carriers.

We know almost nothing of the cost of private water line operations and very little about the cost of operating privately owned trucks. The Federal Coordinator of Transportation made a start on this problem by obtaining voluntary reports from a few private carriers but those figures are now five years old and the samples were too small to be wholly satisfactory.

I have discussed this problem with the representatives of a few of the largest private haulers, and it seems probable that they will co-operate in furnishing cost data for their operations if assured that the only figures made public will be summaries for all comparable services and that individual company data will be kept confidential. I am hopeful that plans for such a survey can be made effective in the near future.

Finally, may I remind you that the Commission's interest in cost finding arises from a real need and a sincere desire to improve the condition of the transportation industry by eliminating obsolete methods of rate making, unprofitable services and wasteful competition. It seems to me absolutely essential that the planning of proper co-ordination of our various modes of transport be made with a full knowledge of the cost of each, so that we may all have cheaper and better transportation with a fair profit to the investor.

CONTROL AND USE OF COSTS IN MOTOR TRUCK OPERATION

By Harold B. Church, Treasurer,
The H. B. Church Truck Service Co., Boston, Mass.

THE motor truck industry is rapidly recognizing the value of cost accounting. Intelligent operation requires more precise cost information for (1) the setting of rates, (2) comparison of operating costs as between makes of trucks, and (3) accurate tax reporting.

While I shall be concerned primarily in this article with the problems of the for-hire motor carrier, the objectives and methods should apply with equal force to the private fleet owner. Although the private owner does not haul for others and therefore need not build a rate structure, he must know his costs if he is to make the best decisions on such matters as choice and utilization of equipment.

Without a knowledge of the elements of costs which enter into the service rendered, an intelligent rate per hundred weight, per mile, per day, week or year cannot possibly be arrived at. Fundamentally, motor carrier accounting is the same as any other kind of accounting and the same principles are employed to serve as a guide in the proper management and to determine future policies of the business, but the application of certain principles to secure special information for the building of rates is of utmost importance.

Records Needed

To maintain control over the costs of operation, careful records as to the consumption of gasoline, oil, parts and labor, must be kept. By the use of several forms a daily record should be maintained for every truck. These forms should show:

1. The quantity of gasoline and oil consumed.
2. The cost of parts and replacements and the hours spent on repairs.
3. The miles traveled.
4. The productive hours operated.

5. The actual running time of the truck.
6. The loading and unloading time of the truck.
7. All lost time or delays.

The last three named are very easily determined by the use of a time recorder placed on each truck. This recorder has a very valuable effect on the operator, and results in substantial savings.

At the close of each period these forms should be totaled and costed, at which time the miles per gallon of gasoline and the miles per quart of oil should be calculated. By so doing it is very easily determined which vehicles are operating efficiently and which are not.

After costing these forms at the close of each period, they should be accumulated by fleets and the total costs for the several items posted to a general fleet expense ledger.

Fixed Charges and Operation's Cost

Registers should be kept for all fixed charges, such as depreciation, registration, insurance and excise taxes, and, at the close of each period, all fixed charges, including rental charge and workmen's compensation insurance, should be charged directly to the fleet expense accounts to which they apply.

To keep track of the operator's time spent on each job, a record should be kept by means of a time card and the time clock, and at the close of each day or the following morning, the time cards should be compared with the time recording chart of each individual truck driven during the day. These charts accurately reflect the time spent on each job, the standing time, delay and lunch time.

At the close of each period the chauffeur's payroll and compensation insurance should be broken down and charged directly to the fleet expense accounts from the payroll record. Social Security taxes also should be charged to the fleets. At the close of each period all indirect charges as well as every item of overhead should be computed and allocated to the various fleets.

Classes of Motor Carriers

For-hire carriers are divided into three general classes by the Motor Carrier Act:

1. Regular route common carriers, which are those serving the general public and operating between cities and towns over regular routes and schedules, similar to rail and express service.
2. Irregular route common carriers are those serving the general public, which go where business calls, when it calls.

The fundamental economic difference in these two types of common carriers, is that the first, operating between points on schedule, is in a position to pick up relatively small shipments from several customers, and combine them in one large consolidated load, thereby reducing transportation costs to a minimum. On the other hand the irregular route carrier, not operating on schedule, must, generally speaking, provide a special truck for each shipment, resulting in much higher costs on small shipments. It is also difficult to provide for return loads, which makes anything better than a 50 per cent load factor practically impossible.

3. The Contract Carrier is identical with the irregular route common carrier, except that service is rendered to specified customers, not to the general public.

There is a fourth type of carrier recognized by the Act, called the Private Carrier, which is the industrial company which carries its own goods.

Three Divisions of Cost

In the moving of freight by motor truck, there are, in addition to the costs of operation, the matters of labor for loading and unloading, and, with a regular route common carrier, a terminal expense involved in sorting the freight and consolidating the loads.

In building rates of regular route carriers for filing tariffs under the Motor Carrier Act, the New England Motor Rate Bureau divides the costs into three parts:

1. Pick-up and delivery, covering the cost of the small truck in picking up and bringing to the terminal, and for delivering from the terminal at the point of destination.
2. The line haul cost is that of the big truck which carries the consolidated load from one terminal to another, as between cities or towns.

3. The terminal costs which cover the overhead of the terminal, the labor for handling the freight and the office cost of billing, etc. The other overhead of conducting the business is allocated to the costs of operating the trucks.

The Contract Carrier and the Irregular Route Common Carrier service involves no terminal expense, since all shipments move directly from the shipper to their destination.

The only difference in the items of costs of these two latter types of for-hire services as compared to the Private Carrier, is that the truckman has an acquisition (sales) and bad debts expense which is not true of the Private Carrier.

They both have only two divisions of expense: one, the cost of operating the truck, including the driver; and two, the cost of extra labor, if any, for loading and unloading.

The Regular Route Common Carrier, as stated previously, has all the items of expense of the other types of carriers plus a terminal expense. We must not confuse terminal expense with garage expense.

Unit for Costing

I am going to deal primarily with the one expense which is common to all types of truck transportation, and this is the cost of operating a truck, including the drivers' wages. The first question that is raised is that of selection of a unit of measurement. Among the units used or proposed are costs per mile, per hour, per day and per hundredweight.

An average cost per hundredweight is of little value to anyone. What we want to know is the cost per hundredweight for any given movement. It is obvious that a long haul costs more than a short haul; the question is how much more. It is also obvious that with a given length of haul it costs more to transport slow loading materials from inaccessible places than quick loading materials from accessible places.

No one can tell how much it costs per mile or per ton-mile to run a truck. Neither can anyone tell how much it costs per hour. One can divide an annual expense by the number of miles operated, and tell what it has cost per mile to run that exact number of miles under those specific conditions over that period. But it is

more difficult to tell how much it would have cost to have run an extra thousand miles, or what the cost per mile would have been with a thousand less miles of operation.

It is clear, of course, that the cost per mile would have been entirely different, since the fixed charges remain the same and only the variable costs, such as gas, oil, tires and repairs, change with greater or less number of miles traveled. This tells us there are two factors affecting these costs: one is distance and the other is time. They cannot be combined into one unit.

As a result of this line of reasoning, the Church Company has always kept costs under two general headings: fixed and variable. The variable we call running expense. We divide the fixed expense for each truck by the number of hours each is expected to be operated, giving us a cost per hour for the various types and sizes of trucks, and we divide the running expense by the truck miles and obtain the cost per mile. We add one-ninth of this cost per hour and per mile to get a 10 per cent profit on the selling price, and we have the rate that is charged to the customers.

Comparison of Cost of Long and Short Runs

This method of accounting enables us to know in advance the cost of any given trip by estimating the number of hours the truck will take at the rate per hour, plus the number of miles at the rate per mile. For example, take a 7½-ton load moving five miles, making 10 miles round trip. Assume it would take one hour to load, one hour to unload, and one hour for the running time, using a cost of $2 per hour and $.15 per mile.

This gives us 3 hours	@	$2.00 =	$6.00
10 miles	@	.15 =	1.50
			$7.50

The cost per hundredweight for 15,000 lbs. = $.05.

It will be noted that the total cost per mile on this short haul is $.75 and the cost per hour is $2.50.

Contrast this with a fifty mile haul of the same load. Assuming a speed of thirty miles per hour after the truck gets out of traffic and the same ten miles per hour used in the first case in traffic,

we have a running time of four hours, plus 2 hours standing time, making a total of 6 hours.

6 hours @ $2.00 per hour —	$12.00
100 miles @ $.15 per mile —	15.00
	$27.00

This is a cost per hundredweight of $.18. The cost per mile is $.27 compared with a cost of $.75 in the first example, and the cost per hour is $4.50 compared with $2.50 on the short haul. This illustrates the absurdity of using a flat cost per mile or per hour for determining what it costs to move a specific load between specific points.

Use of Costs for Rate Making Illustrated

Under the Interstate Commerce Act, it became necessary in 1937 for us to file rates per hundredweight on everything we haul (and we haul about everything) between all points as an Irregular Route Common Carrier. This type of service, as stated before, calls for a special truck for each shipment. In developing these rates, we relied heavily upon our cost figures. To successfully withstand attack, they had to be on a provable cost basis plus a reasonable profit margin.

The foundation costs from which the tariff was built are shown in Exhibits 1A, 1B and 1C, which are based on the 1936 profit and loss statement of the company, complete except for revenue and the expense of loading and unloading labor.

It will be noted that we carry all trucks of one make and size in a group, and the first column, "Truck Months," denotes the total months the trucks in this group were registered and available for service. For example, the first item under "Truck Months" shows 103 months. This includes eight trucks for 12 months and one for 7 months. There may have been additional trucks of this make and size unregistered due to lack of business or seasonal demands. These would not be included in the total truck months, but the depreciation, insurance and rental charge of these idle trucks is included in the fixed costs.

Under the general heading of running expense (Exhibit 1A), the item of repairs is divided into two columns, parts and labor.

Parts denotes all merchandise used in maintenance, including tires. Labor covers the wages of mechanics only.

Application of Depreciation

Half of the depreciation is charged to running expense. It will be recalled that for rate-making purposes our costs are measured in units of miles (running expenses) and of hours (fixed expenses). It is our experience that depreciation is affected both by mileage and by time. Unless each haul is properly balanced between mileage and time, the placing of depreciation entirely into one category would result in cost and rate distortions. For example, if all depreciation was placed in running expenses, and the truck was used in short hauls, compensatory revenue would not be received. Conversely, if depreciation was considered wholly a fixed charge and a special job called for two normal days' mileage in the space of one-half day, the revenue would not cover the proportionate amount of the life taken out of the truck.

The basic figure for depreciation (before allocating one-half to running expense and one-half to fixed expense) is derived on a time basis, but not by the straight-line method. The straight-line basis would write off a given truck at the rate of 20 per cent of the first cost each year for five years. Our method is to deduct one-third of the original cost the first year and one-third of the diminishing remaining value each year until the truck is retired. For example, a truck costing $3,000 and depreciating by our method would have a book value of about $400 at the end of the fifth year. It is our experience that this would be a fair value on a trade-in or for possible further use, and the resulting book adjustments at retirement are much smaller.

Depreciation and Maintenance

Another factor which appears to be important to us is the relationship between depreciation costs and repair and maintenance charges. Repairs and parts replacements are small in the early years of a truck's life and become increasingly large as a truck grows old. The accident of having a disproportionate number of new trucks (or old ones) in the fleet at any one time would result in distortions in cost as between the years. Where our rates are related so closely to yearly costs, it is important to keep a balance

EXHIBIT 1 A

	Truck Months	RUNNING EXPENSES—1936 Gasoline	Oil and Grease	Repairs Parts	Repairs Labor	Depreciation (⅓)	Total Running Expenses	Miles	Cost per Mile
Chevrolet Flat	103	$ 1,509.45	$ 75.75	$ 915.26	$ 515.96	$ 789.25	$ 3,805.67	79,326	4.798¢
Tank	12⅓	368.46	17.10	361.47	207.24	254.83	1,209.10	13,799	8.762¢
Dump	46	382.16	31.35	570.21	297.03	71.24	1,351.99	17,868	7.567¢
70 Van	14	170.30	6.30	47.20	30.17	304.85	558.82	13,406	4.168¢
	175⅓	$ 2,430.37	$ 130.50	$ 1,894.14	$1,050.40	$1,420.17	$ 6,925.58	124,399	5.567¢
Diamond T 20 Tank	4⅓	$ 173.03	$ 2.85	$ 93.94	$ 72.39	$ 125.17	$ 467.38	6,224	7.509¢
30 Flat	27⅔	531.49	31.05	735.51	255.86	87.82	1,641.73	18,479	8.884¢
30 Winch	24	393.07	28.50	459.93	196.23	52.39	1,130.12	13,315	8.488¢
30 Tank—Old	4⅓	295.08	21.20	242.91	120.16	72.27	751.62	9,689	7.758¢
30 Tank—New	1	50.96	2.10	95.42	60.58	28.56	237.62	1,728	13.751¢
40 Flat	24	1,023.71	36.00	714.17	218.72	534.79	2,527.39	34,204	7.389¢
40 Tank	38	2,032.18	94.35	2,019.47	596.88	1,792.61	6,535.49	69,565	9.395¢
	123⅓	$ 4,499.52	$ 216.05	$ 4,361.35	$1,520.82	$2,693.61	$13,291.35	153,204	8.676¢
Ford Flat	71⅓	$ 895.71	$ 58.65	$ 835.73	$ 549.26	$ 381.60	$ 2,720.95	45,052	6.040¢
Tank	31⅓	944.87	52.35	329.97	221.67	814.28	2,363.14	39,360	6.004¢
Dump	22	263.83	17.40	210.14	192.62	481.60	1,165.59	11,600	10.048¢
	125	$ 2,104.41	$ 128.40	$ 1,375.84	$ 963.55	$1,677.48	$ 6,249.68	96,012	6.501¢
White 40 Flat	43	$ 2,093.83	$ 114.45	$ 2,766.78	$1,343.29	$ 347.06	$ 6,665.41	49,323	13.514¢
40 Tank	48⅓	3,482.70	168.00	5,619.22	1,903.67	945.08	12,118.67	88,937	13.626¢
40 Winch	52⅓	1,917.85	99.60	2,248.29	1,199.96	139.35	5,605.05	47,514	11.797¢
40 Dump	7	31.33	.75	47.30	31.51	21.69	132.58	577	22.978¢
	151	$ 7,525.71	$ 382.80	$10,681.59	$4,478.43	$1,453.18	$24,521.71	186,351	13.159¢
Autocar 30 Flat	12	$ 263.17	$ 17.10	$ 198.53	$ 115.82	$ 27.78	$ 622.40	8,784	7.086¢
40 Flat	24	701.17	33.30	541.93	189.47	56.25	1,522.12	19,458	7.823¢
40 Tank	12	451.22	25.50	850.53	219.78	253.22	1,800.25	12,855	14.004¢
	48	$ 1,415.56	$ 75.90	$ 1,590.99	$ 525.07	$ 337.25	$ 3,944.77	41,097	9.599¢
Brockway Flat	15	$ 211.83	$ 16.35	$ 119.43	$ 116.13	$ 37.50	$ 501.24	8,036	6.237¢
40 Flat	11⅓	254.80	24.15	181.23	56.97	46.88	564.03	6,328	8.913¢
Tank	4	41.34	4.80	82.67	44.33	57.29	230.43	1,338	17.222¢
	30⅓	$ 507.97	$ 45.30	$ 383.33	$ 217.43	$ 141.67	$ 1,295.70	15,702	8.252¢
400 Trailer Flat	25⅓	$ 1,376.26	$ 66.15	$ 953.31	$ 332.72	$1,017.11	$ 3,745.55	44,275	8.460¢
International	12	$ 241.36	$ 13.35	$ 91.58	$ 95.30	$ 87.50	$ 529.09	11,014	4.804¢
LaFrance	4⅓	$ 56.81	$ 4.95	$ 24.69	$ 32.85	$ 8.19	$ 127.49	1,373	9.286¢
	695⅓	$20,157.97	$1,063.40	$21,356.82	$9,216.57	$8,836.16	$60,630.92	673,427	9.003¢
Horse and Wagon	.....	*$ 585.38	$.....	$.....	$.....	$ 6.00	$ 591.38	.....	.....
Total	.....	$20,743.35	$1,063.40	$21,356.82	$9,216.57	$8,842.16	$61,222.30	673,427	.....

* Feed, Stabling, etc.

between repairs and depreciation expenses. We believe the diminishing balance method of accumulating depreciation helps materially in this regard, because it charges the early years heavily for depreciation. Those same years see relatively smaller charges for repairs and maintenance.

The table below illustrates the application of our method in contrast with the straight-line basis. In both cases it is assumed that the truck has a life of five years, an original cost of $3,000, and a trade-in value of approximately $400 at the end of the period.

	Straight Line Basis		Percentage of Diminishing Balance Method	
Year	*Yearly Charge*	*Book Value End of Year*	*Yearly Charge*	*Book Value End of Year*
1	$520	$2,480	$1,000	$2,000
2	520	1,960	670	1,330
3	520	1,440	440	890
5	520	920	260	630
5	520	400	210	420
Totals	$2,600	....	$2,580	....
Book Value End of 5-Year Period	.....	$400	.....	$420

To summarize the elements of running expense as shown in Exhibit 1A, it will be seen that we have included those items which vary with mileage. The expenses of gasoline, oil and grease, repairs and one-half of the depreciation are added to give total running expense, by each class of truck. This figure, when divided by total mileage for that class of truck, gives the running expense cost per mile. Sub-totals are prepared by makes of trucks in order to average out any random factors that may appear.

Fixed Expenses

In the fixed expense category (Exhibit 1B), many of the items are self-explanatory. These include one-half of the depreciation, registration, insurance and excise taxes.

The rental charge factor requires some explanation. It is our policy to reduce general overhead to as small a figure as possible. With this in mind, such real estate expenses as taxes, insurance, depreciation, interest, maintenance, light and heat are placed di-

• Feed, Stabling, etc.

EXHIBIT 1 B

	FIXED EXPENSES—1936								
	Depreciation (½)	Registration	Auto Insurance	Excise Taxes	Charge	Overhead	Fixed Cost	Hours	Cost per Hour
Chevrolet Flat	$ 789.24	$ 157.50	$ 1,538.61	$ 84.57	$ 952.97	$ 2,500.13	$ 6,023.02	12,711½	47.383¢
Tank	254.83	16.65	175.72	13.87	115.65	791.84	1,368.56	2,639¾	51.844¢
Dump	71.23	81.14	644.63	19.79	425.60	888.31	2,130.70	2,839	75.051¢
70 Van	304.85	21.92	286.37	28.00	129.53	365.77	1,136.44	2,968½	38.283¢
	$1,420.15	$ 277.21	$ 2,645.33	$ 146.23	$1,623.75	$ 4,546.05	$10,658.72	21,158¾	50.375¢
Diamond T 20 Tank	125.17	9.00	113.39	19.50	41.63	305.48	614.17	1,106¾	55.493¢
30 Flat	87.82	66.09	424.90	17.75	320.36	1,077.23	1,994.15	3,187¾	62.243¢
30 Winch	52.38	48.08	360.09	13.30	277.56	743.61	1,495.02	1,986¾	75.250¢
30 Tank—Old	72.27	6.00	102.73	2.20	49.73	494.40	727.33	1,341	54.238¢
30 Tank—New	28.55	3.00	21.60	10.00	11.57	156.76	231.48	241	96.050¢
40 Flat	534.78	209.64	412.16	87.45	333.07	1,660.05	3,237.15	3,279½	98.709¢
40 New	1,792.60	148.26	423.74	210.34	787.58	4,288.80	7,651.32	4,691	163.106¢
	$2,693.57	$ 490.07	$ 1,858.61	$ 360.54	$1,821.50	$ 8,726.33	$15,950.62	15,833¾	100.738¢
Ford Flat	381.59	116.76	904.40	35.43	661.53	1,788.68	3,888.39	7,039½	55.237¢
Tank	814.27	50.77	489.12	38.52	291.45	1,551.53	3,235.66	5,898¾	54.853¢
Dump	481.59	33.70	302.11	23.59	203.55	763.70	1,808.24	2,169¾	83.358¢
	$1,677.45	$ 201.23	$ 1,695.63	$ 97.54	$1,156.53	$ 4,103.91	$ 8,932.29	15,107½	59.125¢
White 40 Flat	347.07	172.60	778.40	71.94	596.76	4,377.23	6,344.00	7,524¼	84.314¢
40 Flat	945.09	261.60	1,189.61	85.71	673.09	7,954.59	11,109.69	8,803¼	126.200¢
40 Winch	139.36	383.84	867.24	81.06	728.60	3,677.84	5,877.94	7,135¾	82.373¢
40 Dump	21.69	43.00	94.89	18.24	97.15	88.43	363.40	121¾	298.481¢
	$1,453.21	$ 861.04	$ 2,930.14	$ 256.95	$2,095.60	$16,098.09	$23,695.03	23,585	100.467¢
Autocar 30 Flat	27.78	25.34	170.35	14.00	138.78	409.99	786.24	2,338¼	33.625¢
40 Flat	56.25	73.30	387.93	48.06	333.07	996.84	1,895.45	2,893½	65.507¢
40 Tank	253.22	31.87	115.33	12.83	249.81	1,181.73	1,844.79	1,027¾	179.498¢
	$ 337.25	$ 130.51	$ 673.61	74.89	$ 721.66	$ 2,588.56	$ 4,526.48	6,259½	72.314¢
Brockway Flat	37.51	30.26	200.75	11.07	138.78	329.60	747.97	1,246¾	59.994¢
40 Flat	46.87	37.98	167.93	17.36	159.61	369.79	799.54	1,240	64.479¢
Tank	57.29	8.25	54.76	9.31	37.01	152.74	319.36	298½	106.988¢
	141.67	76.49	423.44	37.74	$ 335.40	$ 852.13	$ 1,866.87	2,785¼	67.027¢
400 Trailer Flat	$1,017.11	$ 493.48	$ 446.19	$ 261.80	464.93	2,459.93	5,143.44	4,119¼	124.864¢
International	87.50	24.72	211.05	4.68	138.78	345.68	812.41	2,448	33.187¢
LaFrance	8.19	35.50	64.53	11.74	62.46	84.41	266.83	201	132.751¢
	$8,836.10	$2,590.25	$10,948.53	$1,252.11	$8,420.61	$39,805.09	$71,852.69	91,498	78.529¢
Horse and Wagon	6.00	.....	107.37	.....	.....	389.89	503.26	...	....
Total	$8,842.10	$2,590.25	$11,055.90	$1,252.11	$8,420.61	$40,194.98	$72,355.95	...	....

rectly into the "rental charge" category. These items are allocated to the fleets in proportion to the number of trucks and their sizes.

All other items of indirect expense are combined under the heading "overhead." We have experimented somewhat in our effort to find an equitable basis for allocating this overhead expense to the fleets. At first this was done on the basis of sales revenue. This proved to be unsatisfactory because, of necessity, our mark-up varies somewhat. For two years we have followed the practice of making the allocation on the basis of running expense, and believe this to be more accurate than the sales revenue method. At present, we are considering shifting to a basis of total expense exclusive of overhead. It is felt by some that this would be preferable, because the proportion of running expense to fixed expense tends to vary with the age of the trucks. A new truck costs less for maintenance and more for taxes and insurance.

It can be seen that we are not fully satisfied with the accuracy of our methods of allocating general overhead. In an effort to reduce the amount of the overhead, we have adopted the expedient of the mark-up for certain items of expense. This mark-up is credited directly against overhead and only the net amount must then be allocated.

The items of expense so treated are gasoline, oil, tires, supplies, repair parts and repair labor. In the aggregate this reduces the overhead and increases the direct charges by several thousand dollars annually.

As was the case with running expenses, the total fixed charges are totaled and divided by the number of hours of operation. The resulting figure is the fixed cost per hour (by fleets) of truck operation.

Wages, Social Security Taxes and Compensation Insurance

A third category is that of wages, social security taxes and compensation insurance. The totals of these items are reduced to an hourly rate as well.

Although fixed expenses and drivers' expenses are both figured on a per-hour basis, there is a distinct difference between them. Drivers are paid by the hour. The hourly rates shown are fixed per hour, but are variable directly with the number of hours worked. Most of the items segregated under fixed expense are

EXHIBIT 1 C

	Wages and Compensation Insurance—1936				Summary			
	Wages and Social Sec. Taxes	Compensation Insurance	Total Wages and Comp. Insurance	Cost per Hour	Total Running Expenses	Total Fixed Cost	Total Wages and Comp. Insurance	Total Cost
Chevrolet Flat	$ 6,941.99	$ 316.34	$ 7,258.33	57.101¢	$ 3,805.67	$ 6,023.02	$ 7,258.33	$ 17,087.02
Tank	1,357.36	72.47	1,429.83	54.165¢	1,209.10	1,368.56	1,429.83	4,007.49
Dump	1,540.11	81.76	1,621.87	57.128¢	1,351.99	2,130.70	1,621.87	5,104.56
70 Van	1,504.28	.99	1,505.27	50.708¢	558.82	1,136.44	1,505.27	3,200.53
	$11,343.74	$ 471.56	$11,815.30	55.841¢	$ 6,925.58	$10,658.72	$11,815.30	$ 29,399.60
Diamond T 20 Tank	$ 566.87	$ 35.31	$ 602.18	54.410¢	$ 467.38	$ 614.17	$ 602.18	$ 1,683.73
30 Flat	1,733.82	88.41	1,822.23	57.164¢	1,641.73	1,994.15	1,822.23	5,458.11
30 Winch	1,134.42	59.05	1,193.47	60.072¢	1,130.12	1,495.02	1,193.47	3,818.61
30 Tank—Old	698.64	37.66	736.30	54.907¢	751.62	727.33	736.30	2,215.25
30 Tank—New	124.14	13.53	137.67	57.125¢	237.62	231.48	137.67	606.77
40 Flat	1,953.97	97.96	2,051.93	62.568¢	2,527.39	3,237.15	2,051.93	7,816.47
40 Tank	2,750.26	151.04	2,901.30	61.848¢	6,535.49	7,651.32	2,901.30	17,088.11
	$ 8,962.12	$ 482.96	$ 9,445.08	59.652¢	$13,291.35	$15,950.62	$ 9,445.08	$ 38,687.05
Ford Flat	$ 3,832.77	$ 195.59	$ 4,028.36	57.225¢	$ 2,720.95	$ 3,888.39	$ 4,028.36	$ 10,637.70
Tank	2,961.29	147.96	3,109.25	52.710¢	2,363.14	3,235.66	3,109.25	8,708.05
Dump	1,170.94	60.05	1,230.99	56.747¢	1,165.59	1,808.24	1,230.99	4,204.82
	$ 7,965.00	$ 403.60	$ 8,368.60	55.394¢	$ 6,249.68	$ 8,932.29	$ 8,368.60	$ 23,550.57
White 40 Flat	$ 4,422.03	$ 244.59	$ 4,666.62	62.021¢	$ 6,665.41	$ 6,344.00	$ 4,666.62	$ 17,676.03
40 Tank	5,079.68	306.01	5,385.69	61.178¢	12,118.67	11,109.69	5,385.69	28,614.05
40 Winch	4,302.65	238.78	4,541.43	63.643¢	5,605.05	5,877.94	4,541.43	16,024.42
40 Dump	65.38	- 4.21	69.59	57.158¢	132.58	363.40	69.59	565.57
	$13,869.74	$ 793.59	$14,663.33	62.172¢	$24,521.71	$23,695.03	$14,663.33	$ 62,880.07
Autocar 30 Flat	$ 1,185.10	$ 3.89	$ 1,188.99	50.850¢	$ 622.40	$ 786.24	$ 1,188.99	$ 2,597.63
40 Flat	1,709.58	86.33	1,795.91	62.067¢	1,522.12	1,895.45	1,795.91	5,213.48
40 Tank	610.62	36.37	646.99	62.952¢	1,800.25	1,844.79	646.99	4,292.03
	$ 3,505.30	$ 126.59	$ 3,631.89	58.022¢	$ 3,944.77	$ 4,526.48	$ 3,631.89	$ 12,103.14
Brockway Flat	$ 643.30	$ 3.66	$ 646.96	51.892¢	$ 501.24	$ 747.97	$ 646.96	$ 1,896.17
40 Flat	626.79	31.96	658.75	53.125¢	564.03	799.54	658.75	2,022.32
Tank	138.73	8.16	146.89	49.209¢	230.43	319.36	146.89	696.68
	$ 1,408.82	$ 43.78	$ 1,452.60	52.153¢	$ 1,295.70	$ 1,866.87	$ 1,452.60	$ 4,615.17
400 Trailer Flat	$ 2,419.74	$ 122.71	$ 2,542.45	61.721¢	$ 3,745.55	$ 5,143.44	$ 2,542.45	$ 11,431.44
International	$ 1,289.94	$ 62.71	$ 1,352.65	55.255¢	$ 529.09	$ 812.41	$ 1,352.65	$ 2,694.15
LaFrance	$ 106.94	$ 6.08	$ 113.02	56.229¢	$ 127.49	$ 266.83	$ 113.02	$ 507.34
	$50,871.34	$2,513.58	$53,384.92	58.345¢	$60,630.92	$71,852.69	$53,384.92	$185,868.53
Horse and Wagon	$ 1,294.66	..	$ 1,294.66	..	$ 591.38	$ 503.26	$ 1,294.66	$ 2,389.30
Total	$52,166.00	$2,513.58	$54.679.58	..	$61,222.30	$72,355.95	$54,679.58	$188,257.83

fixed in terms of the year or the day and therefore are variable per hour under circumstances where more or less than the average hours are worked.

In our operation the percentage of productive time of the numerous fleets varies greatly over the period of a year. This results in a great variation in fixed cost per hour, which, unless analyzed, would produce rates having little equitable relationship to the size and use of a particular truck.

The figures in Exhibits 1A, 1B and 1C were derived solely from the actual expenses and actual operating miles and hours for the year 1936. In preparing the irregular route tariff, we felt it necessary to make an analysis to show the costs of different trucks under varying conditions of average daily use.

Variation of Costs with Hours per Day

The resulting figures are shown in Exhibit 2, which shows by fleets the variation in hourly fixed charges (exclusive of drivers' expenses) under conditions ranging from an average of five hours per day to ten hours per day.

We developed the table by first bringing the 1936 fixed costs to what they would have been if we had averaged eight hours per day, exclusive of Sundays and holidays, for each fleet. The principal items of cost affected fell into the "overhead" category. To have averaged eight hours per day we would have had to increase our business. Such items as sales costs, bad debts, billing, telephone, certain insurance expenses, etc., would have been increased.

Using the same line of reasoning, we established hourly cost figures for the columns from five hours to ten hours inclusive. As our trucks actually averaged about seven hours' daily use, it was the seven-hour column which was used in developing the rates presented to the Commission. A collateral advantage which accrued was the ability to figure more accurately on special contract work, particularly if it involved abnormally short or abnormally long working hours.

Combining Cost Per Hour and Per Mile

The next step in producing this tariff was to plot a graph for each fleet with two curves, one showing the running cost per mile

EXHIBIT 2

COST ANALYSIS OF THE OPERATION OF THE H. B. CHURCH TRUCK SERVICE COMPANY'S TRUCKS FOR THE YEAR 1936 SHOWING VARIATION IN FIXED CHARGES, EXCLUSIVE OF DRIVER, AS BETWEEN FIVE HOUR DAY OPERATION ANT TEN HOUR DAY OPERATION SHOWN IN CENTS PER HOUR.

	Fleet	*5 Hours*	*6 Hours*	*7 Hours*	*8 Hours*	*9 Hours*	*10 Hours*
A	Chevrolet Flat	53.80¢	44.83¢	38.43¢	33.63¢	29.89¢	26.90¢
	Chevrolet Tank	77.42	64.51	55.30	48.39	43.01	38.71
	Chevrolet Dump	63.90	53.25	45.64	39.94	35.50	31.95
A	Chevrolet Van	59.79	49.82	42.71	37.37	33.22	29.89
B	Diamond T 20 Tank	92.04	76.70	65.74	57.53	51.13	46.02
B	Diamond T 30 Flat	72.20	60.16	51.57	45.13	40.11	36.10
	Diamond T 30 Winch	77.42	64.52	55.30	48.39	43.01	38.71
	Diamond T 30 Tank (Old)	92.56	77.13	66.11	57.85	51.42	46.28
	Diamond T 30 Tank (New)	147.13	122.61	105.09	91.96	81.74	73.56
C	Diamond T 40 Flat	120.43	100.36	86.02	75.27	66.91	60.21
	Diamond T 40 Tank	233.52	194.60	166.80	145.95	129.73	116.67
A	Ford Flat	57.77	48.14	41.26	36.11	32.09	28.88
	Ford Tank	78.09	65.07	55.78	48.81	43.38	39.04
	Ford Dump	85.69	71.41	61.21	53.56	47.60	42.84
	White 40 Flat	115.21	96.01	82.29	72.07	64.00	57.61
	White 40 Tank	174.41	145.34	124.58	109.01	96.89	87.20
	White 40 Winch	103.31	86.09	73.79	64.57	57.39	51.65
	White 40 Dump	128.16	106.80	91.54	80.10	71.20	64.08
B	Autocar 30 Flat	48.59	40.49	34.71	30.37	26.99	24.29
C	Autocar 40 Flat	76.62	63.85	54.73	47.89	42.57	38.31
	Autocar 40 Tank	254.33	211.94	181.66	158.96	141.29	127.16
A	Brockway Flat	57.93	48.28	41.38	36.21	32.18	28.96
C	Brockway 40 Flat	70.20	58.50	50.14	43.87	39.00	35.10
	Brockway Tank	102.04	85.03	72.88	63.78	56.69	51.02
D	400 Trailer	179.93	149.94	142.71	112.46	99.96	89.96
B	International	50.09	41.74	35.78	31.31	27.37	25.04
	LaFrance	88.67	73.89	63.34	55.42	49.26	44.33
	Horse and Wagon	29.26	24.38	20.90	18.29	16.26	14.63
	Tons	AVERAGE COST PER HOUR FOR ABOVE GROUPS					
Group A—	3	57.32	47.77	40.95	35.83	31.84	28.66
Group B—	4 to 6	65.73	54.77	46.95	41.08	36.40	32.86
Group C—	8	89.08	74.24	63.63	55.68	49.49	44.54
Group D—	12	179.93	149.94	142.71	112.46	99.96	89.96

and one showing the fixed cost per hour. This enabled us to know the cost per hour *and* the cost per mile for transporting all weights of shipments.

Knowing the cost per hour and the cost per mile, it was then necessary to know the time that would be required for the truck to make the round trip haul in each five-mile zone (the regulations

required establishing rates in terms of five-mile zones). We adopted estimated speeds as follows:

	Heavy Trucks	*Light Trucks*
First 5 miles	10 miles per hour	10 miles per hour
Last 5 miles	15 " " "	15 " " "
Intermediate Mileage.	25 " " "	28 " " "

The underlying assumption was that a shipment normally would pass through a heavily congested zone at one end and a less heavily congested zone at the other end, with open country in between. We assumed a loading time of 10 minutes per ton, plus 15 minutes for the driver to contact the shipper and to discuss the ball game. The same allowance was made at the destination.

As a result of the various types of information explained above, it was relatively simple to figure the time of the truck involved in any shipment at the rate per hour for the suitable truck. The running expense was added (based on round-trip mileage). The sum of these costs, plus one-ninth for a 10 per cent profit, gave the revenue needed for the shipment.

The Final Rates

The proposed tariff had to be stated in terms of hundred-weight. This was derived by dividing the total revenue needed by the weight of the shipment. Exhibits 3A and 3B are samples of the tariff so prepared and filed by us. The section illustrated is for so-called fifth class freight, meaning freight of sufficient density so that a capacity load can be carried on a standard body (i.e. 20 pounds per cubic foot). An official classification is used to obtain the rates on other classes of freight, which are expressed in terms of percentage of the fifth class rate. This assures adequate compensation for so-called "balloon" loads.

It should be emphasized that many of the points illustrated in this paper are peculiar to the irregular route carrier as opposed to those carriers operating on a regular route with pay loads in both directions.

I am aware, also, that rates built solely from costs may not be entirely equitable, if the costs themselves are unreasonable. It is clear to me, however, that a thorough knowledge of costs, and

EXHIBIT 3 A

FIFTH CLASS RATES

Miles	Weight of Shipments in Pounds: 1000-1500	1501-2250	2251-3000	3001-4000	4001-5000	5001-6000	6001-7000
	Rates per 100 Pounds						
Over 0 to 5..	$ .25	$ .17	$ .12	$ .10	$ .08	$ .07	$ .06½
Over 5 to 10..	.37	.25	.18	.14	.11	.10	.08
Over 10 to 15..	.47	.32	.23	.18	.14	.12	.10
Over 15 to 20..	.56	.38	.27	.21	.17	.14	.12
Over 20 to 25..	.65	.44	.31	.24	.19	.16	.14
Over 25 to 30..	.75	.51	.35	.28	.22	.18	.16
Over 30 to 35..	.84	.58	.40	.31	.24	.20	.18
Over 35 to 40..	.94	.64	.44	.34	.27	.22	.19
Over 40 to 45..	1.04	.71	.48	.38	.29	.24	.21
Over 45 to 50..	1.13	.77	.53	.41	.32	.26	.23
Over 50 to 55..	1.23	.83	.57	.44	.34	.28	.25
Over 55 to 60..	1.33	.90	.61	.48	.37	.30	.26
Over 60 to 65..	1.42	.96	.65	.51	.39	.32	.28
Over 65 to 70..	1.52	1.02	.70	.54	.42	.34	.30
Over 70 to 75..	1.61	1.09	.74	.58	.44	.37	.32
Over 75 to 80..	1.71	1.15	.78	.61	.47	.39	.33
Over 80 to 85..	1.81	1.22	.83	.64	.49	.41	.35
Over 85 to 90..	1.90	1.28	.87	.68	.52	.43	.37
Over 90 to 95..	2.00	1.35	.92	.71	.55	.45	.39
Over 95 to 100..	2.09	1.41	.96	.74	.57	.47	.41
Over 100 to 105..	2.19	1.48	1.00	.78	.60	.49	.42
Over 105 to 110..	2.29	1.54	1.05	.81	.62	.51	.44
Over 110 to 115..	2.38	1.61	1.09	.85	.65	.53	.46
Over 115 to 120..	2.48	1.67	1.13	.88	.67	.55	.48
Over 120 to 125..	2.57	1.74	1.18	.91	.70	.58	.50
Over 125 to 130..	2.67	1.80	1.22	.95	.73	.60	.51
Over 130 to 135..	2.77	1.87	1.27	.98	.75	.62	.53
Over 135 to 140..	2.86	1.93	1.31	1.01	.78	.64	.55
Over 140 to 145..	2.96	2.00	1.35	1.05	.80	.66	.57
Over 145 to 150..	3.05	2.06	1.40	1.08	.83	.68	.59
Over 150 to 155..	3.15	2.15	1.44	1.12	.85	.70	.60
Over 155 to 160..	3.25	2.19	1.48	1.15	.88	.72	.62
Over 160 to 165..	3.34	2.25	1.53	1.18	.91	.74	.64
Over 165 to 170..	3.44	2.32	1.57	1.22	.93	.76	.66
Over 170 to 175..	3.53	2.38	1.62	1.25	.96	.79	.68
Over 175 to 180..	3.63	2.45	1.66	1.28	.98	.81	.69
Over 180 to 185..	3.73	2.51	1.70	1.32	1.01	.83	.71
Over 185 to 190..	3.82	2.58	1.75	1.35	1.03	.85	.73
Over 190 to 195..	3.92	2.64	1.79	1.39	1.06	.87	.75
Over 195 to 200..	4.01	2.71	1.83	1.42	1.09	.89	.77
Over 200 to 205..	4.10	2.77	1.88	1.45	1.11	.91	.78
Over 205 to 210..	4.20	2.84	1.92	1.49	1.14	.93	.80
Over 210 to 215..	4.30	2.90	1.96	1.52	1.16	.95	.82
Over 215 to 220..	4.39	2.97	2.01	1.55	1.19	.97	.84
Over 220 to 225..	4.49	3.03	2.05	1.59	1.21	1.00	.86
Over 225 to 230..	4.58	3.10	2.10	1.62	1.24	1.02	.87
Over 230 to 235..	4.68	3.16	2.14	1.65	1.27	1.04	.89
Over 235 to 240..	4.78	3.23	2.18	1.69	1.29	1.06	.91
Over 240 to 245..	4.87	3.29	2.23	1.72	1.31	1.08	.93
Over 245 to 250..	4.95	3.36	2.27	1.75	1.34	1.10	.95
Each additional five miles add:	.096	.0648	.0437	.0337	.0257	.021	.018

EXHIBIT 3 B

FIFTH CLASS RATES

Miles	Weight of Shipments in Pounds: 7001-8000	8001-10000	10001-12000	12001-14000	14001-17000	17001-20000	Over 20000
	Rates per 100 Pounds						
Over 0 to 5..	$.06	$.05½	$.05	$.05	$.05	$.05	$.04½
Over 5 to 10..	.07½	.07	.06	.06	.06	.06	.05½
Over 10 to 15..	.09	.08½	.07½	.07	.07	.07	.06½
Over 15 to 20..	.11	.10	.09	.08	.08	.08	.07½
Over 20 to 25..	.12	.11	.10	.09	.09	.08½	.08
Over 25 to 30..	.14	.13	.11	.10	.09½	.09	.09
Over 30 to 35..	.16	.14	.12	.11½	.10½	.10	.10
Over 35 to 40..	.17	.15	.13	.12½	.11½	.11	.11
Over 40 to 45..	.19	.17	.15	.13½.	12½	.12	.11½
Over 45 to 50..	.20	.18	.16	.14½	.13½	.13	.12½
Over 50 to 55..	.22	.20	.17	.16	.15	.14	.13
Over 55 to 60..	.23	.21	.18	.17	.16	.15	.14
Over 60 to 65..	.25	.22	.19	.18	.17	.16	.15
Over 65 to 70..	.26	.24	.20	.19	.18	.17	.16
Over 70 to 75..	.28	.25	.22	.20	.19	.17	.16
Over 75 to 80..	.30	.27	.23	.21	.20	.18	.17
Over 80 to 85..	.31	.28	.24	.22	.21	.19	.18
Over 85 to 90..	.33	.29	.25	.23	.22	.20	.19
Over 90 to 95..	.35	.31	.26	.24	.23	.21	.20
Over 95 to 100..	.36	.32	.27	.26	.24	.22	.20
Over 100 to 105..	.38	.34	.29	.27	.25	.22	.21
Over 105 to 110..	.39	.35	.30	.28	.26	.23	.22
Over 110 to 115..	.41	.36	.31	.29	.27	.24	.23
Over 115 to 120..	.42	.38	.32	.30	.28	.25	.24
Over 120 to 125..	.44	.39	.33	.31	.29	.26	.25
Over 125 to 130..	.46	.41	.34	.32	.30	.27	.25
Over 130 to 135..	.47	.42	.36	.33	.31	.28	.26
Over 135 to 140..	.49	.44	.37	.34	.32	.29	.27
Over 140 to 145..	.50	.45	.38	.35	.33	.30	.28
Over 145 to 150..	.52	.46	.39	.36	.34	.30	.29
Over 150 to 155..	.54	.48	.40	.38	.35	.31	.29
Over 155 to 160..	.55	.49	.42	.39	.36	.32	.30
Over 160 to 165..	.57	.51	.43	.40	.37	.33	.31
Over 165 to 170..	.58	.52	.44	.41	.38	.34	.32
Over 170 to 175..	.60	.53	.45	.42	.39	.35	.33
Over 175 to 180..	.61	.55	.46	.43	.40	.36	.34
Over 180 to 185..	.63	.56	.47	.44	.41	.37	.34
Over 185 to 190..	.65	.58	.49	.45	.42	.38	.35
Over 190 to 195..	.66	.59	.50	.46	.43	.38	.36
Over 195 to 200..	.68	.61	.51	.48	.44	.39	.37
Over 200 to 205..	.69	.62	.52	.49	.44	.40	.38
Over 205 to 210..	.71	.63	.53	.50	.45	.41	.38
Over 210 to 215..	.73	.65	.55	.51	.46	.42	.39
Over 215 to 220..	.74	.66	.56	.52	.47	.43	.40
Over 220 to 225..	.76	.67	.57	.53	.48	.44	.41
Over 225 to 230..	.77	.69	.58	.54	.49	.45	.42
Over 230 to 235..	.79	.70	.59	.55	.50	.46	.43
Over 235 to 240..	.80	.72	.60	.56	.51	.47	.43
Over 240 to 245..	.82	.73	.62	.58	.52	.48	.44
Over 245 to 250..	.84	.75	.63	.59	.53	.49	.45
Each additional five miles add:	.0159	.0141	.0118	.011	.0099	.0089	.0082

more important, of the characteristics of different elements of the costs, is essential for the intelligent setting of rates. This is to say nothing of the great value to be derived from cost information for purposes of control and for the intelligent selection and utilization of equipment.

It is my opinion that there is a remarkable opportunity for the industrial accountant to be of service to the trucking industry in the development within the industry of an appreciation of cost information and a higher standard for its use.